

AP Chemistry – Chapter 3: Molecules, Ions and Their Compounds Supplemental Worksheet

Name: _____ Date: _____ Period: _____

1. The compound Fe_3S_4 is magnetic. It is found in bacteria, and it is thought that the bacteria use the magnetic properties as a means of orientation in the earth's magnetic field. If the charge on sulfur is 2-, the charge on Fe is not an integral number. How can you explain this? [Hint: you might think of the compound as composed of two different compounds.]
2. Many familiar substances have common, unsystematic names. For each of the following, give the correct systematic name:
a) saltpeter, KNO_3 b) soda ash, Na_2CO_3 c) lime, CaO d) muriatic acid, HCl
e) Epsom salts, MgSO_4 f) milk of magnesia, $\text{Mg}(\text{OH})_2$
3. Calculate the percent carbon in capsaicin, $\text{C}_{18}\text{H}_{27}\text{NO}_3$, the compound that gives the hot taste to chili peppers.
4. a) One molecule of the antibiotic known as penicillin G has a mass of 5.342×10^{-21} g. What is the molar mass of penicillin G?
b) Hemoglobin, the oxygen carrying protein in red blood cells, has four iron atoms per molecule and contains 0.340 percent iron by mass. Calculate the molar mass of hemoglobin.
5. An oxybromate compound, KBrO_x , where x is unknown, is analyzed and found to contain 52.92 percent Br. What is the value of x?
6. An organic compound was found to contain only three elements, C, H, and Cl. When a 1.50g sample of the compound was completely combusted in air, 3.52g of CO_2 was formed. In a separate experiment the chlorine in a 1.00g sample of the compound was converted to 1.27g of AgCl . Determine the empirical formula of the compound.

7. Two binary compounds of phosphorus and an unknown element X have X/P mass ratios of 1.84 and 3.06. If both compounds are made up of molecules that have only one atom of phosphorus, what is the identity of element X and what are the formulas of the two compounds?

8. A mixture of $\text{BaCl}_2 \cdot 2\text{H}_2\text{O}$ and NaCl with a mass of 1.6992g is placed in a vial weighing 3.3531g. The mixture is heated at 105°C to drive off the water. The residue of the mixture now has a mass of 1.4804g. Use the preceding data to calculate the % NaCl in the mixture.

9. Supply either a formula to match the name or a name to match the formula for each of the following binary molecular compounds.

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|-------------------------|---------------------------|------------------------------|--------------------|-----------------------------|
| a) PF_3 | b) I_2O_5 | c) P_4S_{10} | d) SiCl_4 | e) phosphorus pentachloride |
| f) sulfur tetrafluoride | g) dinitrogen pentoxide | h) tetraphosphorus hexoxide | | |

10. Iron, as Fe^{2+} , is an essential nutrient. Pregnant women often take 325mg ferrous sulfate (FeSO_4) tablets as a dietary supplement. Yet iron tablets are the leading cause of poisoning deaths in children. As little as 550.mg Fe^{2+} can be fatal to a 22-lb child. How many 325mg ferrous sulfate tablets would it take to constitute a lethal dose to a 22-lb child?